EXAMPLE BURN PLAN

ADDRESSING AIR RESOURCE IMPACTS FROM PRESCRIBED FIRE SMOKE

LAST UPDATED: February 16, 2007

= DEQ text

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PRESCRIBED FIRE PLAN

ADMINISTRATIVE UNIT(S): Wise River Ranger District, Beaverhead – Deerlodge National Forest, USFS Region 1

PRESCRIBED FIRE NAME: Elkhorn Wildlife Management Burn Project

PREPARED BY: Bob Habeck, DIVS **DATE:** February, 2007
Name & Qualification

TECHNICAL REVIEW BY: My Boss, RXB1 **DATE:** February, 2007
Name & Qualification

COMPLEXITY RATING: COMPLEX

DEQ NOTE: *ON - Page: 1*
Expand your determination of complexity to include smoke management. These situations generally include urban interface situations, close proximity to public roadways, and/or multiple-day events with unpredictable meteorology and residual smoke.

APPROVED BY: Your Line Officer **DATE:** February 2007

Agency Administrator

THIS DOCUMENT LOCATED AT:

http://www.deq.mt.gov/AirQuality/AQinfo.asp

DISCLAIMER

This example burn plan represents a comprehensive approach to fully disclosing the potential air quality impacts caused by smoke from prescribed burning at the burn project level. The appropriate level of analysis for each burn project will vary with the size and complexity of the project. Air quality information may be provided in the project environmental assessment (EA) or environmental impact statement (EIS) and simply referenced in the project burn plan. Readers will need to decide the level of air quality analysis required for their burn projects on a case-by-case basis, and cite information appropriately.

This example approach and burn plan outline is not required, nor does it necessarily satisfy all legal requirements, including regulations associated with the State of Montana Open Burning regulations at ARM 17.8.601, et seq., or major source burn permit requirements. The Montana Department of Environmental Quality retains the discretion to restrict burning or propose alternative / additional burning techniques for minimizing smoke impacts caused by prescribed burning.

Questions, comments, or suggestions on improving this document are encouraged. Forward specific comments regarding this document to Bob Habeck, Supervisor of the Air Quality Policy & Planning Section, Montana Department of Environmental Quality, (406) 444-7305 or bhabeck@mt.gov

ELEMENT 1: AGENCY ADMINISTRATOR PRE-IGNITION APPROVAL CHECKLIST

Instructions: The Agency Administrator's Pre-Ignition Approval is the intermediate planning review process (i.e. between the Prescribed Fire Complexity Rating System Guide and Go/No-Go Checklist) that should be completed before a prescribed fire can be implemented. The Agency Administrator's Pre-Ignition Approval evaluates whether compliance requirements, Prescribed Fire Plan elements, and internal and external notifications have been or will be completed and expresses the Agency Administrator's intent to implement the Prescribed Fire Plan. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new approval will be required.

YES	NO	KEY ELEMENT QUESTIONS
XXX		**Is the Prescribed Fire Plan up to date?** *Hints: amendments, seasonality.* ***DEQ NOTE:*** *Do not assume previous burn plan authors provided sufficient time and attention to addressing smoke management. Review text and ensure all opportunities to address smoke management are current – including any new sensitive areas, people, roadways, etc.*
XXX		**Will all compliance requirements be completed?** *Hints: cultural, threatened and endangered species, smoke management, NEPA.* ***DEQ NOTE:*** *Include a copy of the burn day meteorological forecast along with the DEQ / SMP dispersion forecast approval. Burns must be entered into AMS. Ensure agency major open burning permit is valid and in hand. Be familiar with permt terms and conditions. See AMS website for link to DEQ open burning permits.*
XXX		**Is risk management in place and the residual risk acceptable?** *Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented?* ***DEQ NOTE:*** *Smoke management should be factored into any complexity rating. Ensure sensitive areas are considered and outline specific contingency measures for situations warranting rapid smoke management actions. You may include a reference to the NWGC PMS 420-2 NFES 1279 publication titled "Smoke Management Guide for Prescribed and Wildland Fire 2001 edition."*
		Will all elements of the Prescribed Fire Plan be met? *Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources*

XXX		***DEQ NOTE:*** *Include elements that address smoke management. These may be lookouts with digital cameras, journal notes of general observations, fuel preparation techniques, ignition patterns, fuel moistures, dispersion forecasts, predictive modeling, fuel configurations, etc.*
XXX		**Will all internal and external notifications and media releases be completed?** *Hints: Preparedness level restrictions* ***DEQ NOTE:*** *Public notice through phone / fax / e-mail trees, landowner show-and-tell opportunities, etc. Be the first and best sources of your information –including smoke management.*
XXX		**Will key agency staff be fully briefed and understand prescribed fire implementation?** ***DEQ NOTE:*** *Do not forget to interface with Line Officers and assure them that, in part, all necessary air quality regulators have been notified and/or are aware of this burn and that smoke management is adequately addressed. Political forces are often stronger than even the best science and practice.*
XXX		**Are there any other extenuating circumstances that would preclude the successful implementation of the plan?** ***DEQ NOTE:*** *Especially a community or person extra-sensitive to smoke. Take advantage of all opportunities for outreach, education, and show-and-tell.*
XXX		**Have you determined if and when you are to be notified that contingency actions are being taken? Will this be communicated to the Burn Boss?** ***DEQ NOTE:*** *Contingency actions must include smoke management actions. Those always include: (1) stop ignition; (2) increase burning efficiency through chunking, external fuel sources, forced air, etc.; and (3) if necessary, limited suppression / suppression. Know your smoke management contingencies beforehand and have the appropriate equipment / resources on site. ESTABLISH SMOKE TRIGGER POINTS TO IMPLEMENT THESE CONTINGENCY MEASURES.*

XXX		**Other:** ***DEQ NOTE:*** *The pre-ignition checklist is a great time to review the entire project for smoke management. Always consider the strategy of igniting less than what's available in order to reduce risk of smoke impacts. Also, take credit for only the acres blackened by fire – which is most always fewer than what is proposed. This demonstrates less smoke emissions that what could have been possible. Conduct post-burn AAR's to include smoke management to re-enforce priority and to improve outcomes.*

Recommended by: _____ Date: _____
FMO/Prescribed Fire Burn Boss

Approved by: _____ Date: _____
Agency Administrator

Approval expires (date): _____

ELEMENT 2: PRESCRIBED FIRE GO / NO-GO CHECKLIST

A. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO proceed with checklist., if YES go to item B.	**YES**	**NO** **XXX**
B. If YES, have appropriate changes been made to the Ignition and Holding plan and the Mop Up and Patrol Plans? If YES proceed with checklist below, if NO STOP.	**NA**	**NA**

YES	NO	QUESTIONS
XXX		**Are ALL fire prescription elements met?** ***DEQ NOTE:*** *Always review why you are burning – be prepared to tell the public that alternatives to burning were either considered, taken in part, or were limited in availability. Mosaic burning, for example, always results in fewer smoke emissions than aggressive landscape burning. Remember to take credit for smoke emissions avoided due to prescription elements such as fuel moisture, configurations, ignition techniques, mop-up category, etc.*
XXX		**Are ALL smoke management specifications met?** ***DEQ NOTE:*** *AMS request / approval, open burning permit in hand, dispersion forecast / spot weather in hand, a determination that BACT is achievable on-site and throughout the duration of the burn. Consider the effects of residual smoke on multiple day burns. Contact county programs that regulate open burning [Missoula, Flathead, Yellowstone, Lincoln, and Cascade]. Winter burning requires DEQ (or county) application and approval.*
XXX		**Has ALL required current and projected fire weather forecast been obtained and are they favorable?** ***DEQ NOTE:*** *Remember that DEQ / SMP dispersion forecast is one of many factors in determining BACT at the site. An "approval" to burn is really only a recommendation to proceed with the remainder of your BACT determination. Ignite test strips, sling onsite weather throughout the burn, evaluate smoke plume height and trajectory. Document, document, document.*

XXX		**Are ALL planned operations personnel and equipment on-site, available, and operational?** ***DEQ NOTE:*** *Equipment may include an air quality nepholometer. These portable air quality monitors are available to check-out from the R-1 cache. Each district should have two-three people familiar with siting and operating this machine. The information most always demonstrates fewer emissions than what may be attributed to your burn.*
XXX		**Has the availability of ALL contingency resources been checked, and are they available?** ***DEQ NOTE:*** *Ensure those resources necessary to implement a smoke management contingency measure are available. Review smoke management response prior to ignition at tailgate safety briefing.*
XXX		**Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?** ***DEQ NOTE:*** *Everyone should be aware of smoke management contingency measures. Also consider personal health and safety regarding smoke management. Rotate personnel frequently; ignite as you can safely hold.*
XXX		**Have all the pre-burn considerations identified in the Prescribed Fire Plan been completed or addressed?** ***DEQ NOTE:*** *Pre-burn considerations must include consideration for smoke management. This includes contingency measures, resources, mop-up strategies, interested party notifications, etc.*
XXX		**Have ALL the required notifications been made?** ***DEQ NOTE:*** *This includes notification of interested parties, weather, legal approvals, resources, roadway signs, etc. Smoke emissions from your burn will be the most visible aspect of your burn. Reduce the chance that smoke emissions will surprise anyone or cause any controversy.*

XXX		**Are ALL permits and clearances obtained?** ***DEQ NOTE:*** *Include the AMS burn unit request / approval in your burn plan documentation package. The open burning permit is negotiated for you at the Regional Office. Have a copy of your burn permit in hand.*
XXX		**In your opinion, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?** ***DEQ NOTE:*** *And will the burn comply with state, county, and federal rules addressing air quality? Will this burn cause or contribute to NAAQS exceedances? Will it create visibility impairment contrary to any applicable visibility plan? Is there any potential for nuisance complaints? Are you ready to explain all the smoke mitigation techniques and strategies you will employ? You may have mitigated smoke more than you have given yourself credit for – tell the whole story.*

If all the questions were answered "YES" proceed with a test fire.
Document the current conditions, location, and results

_____ _____

Burn Boss Date

ELEMENT 3 COMPLEXITY ANALYSIS SUMMARY

PRESCRIBED FIRE NAME			
ELEMENT	**RISK**	**POTENTIAL CONSEQUENCE**	**TECHNICAL DIFFICULTY**
1. Potential for escape			
2. The number and dependence of activities			
3. Off-site Values*			
4. On-Site Values*			
5. Fire Behavior			
6. Management organization			
7. Public and political Interest*			
8. Fire Treatment objectives			
9. Constraints*			
10. Safety*			
11. Ignition procedures / Methods*			
12. Interagency coordination*			
13. Project logistics			
14 Smoke management*			

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK*	
CONSEQUENCES	
TECHNICAL DIFFICULTY	
SUMMARY COMPLEXITY DETERMINATION	
RATIONALE:	

*** BOLD = Elements that include smoke management considerations**

DEQ NOTE: *Do not restrict your consideration for smoke management to only Element #14. Those elements (in bold, above) have potential for smoke management considerations. Ensure that your complexity analysis includes smoke management from a variety of perspectives.*

ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA

A. Physical Description

1. Location**:**
2. Size:
3. Topography:
4. Project Boundary:

B. Vegetation/Fuels Description:

1. On-site fuels data
2. Adjacent fuels data

C. Description of Unique Features:

DEQ NOTE: *The same geographic features that determine fire behavior will predict smoke emissions. Be aware of the burn unit location and how that will affect smoke emissions, diurnal winds, population centers, sensitive features, water bodies, fuel type and moisture, shading, micro-site characteristics, etc. Unique Features may include smoke-sensitive features, including equipment like radio towers, microwave stations, etc.*

ELEMENT 5: GOALS AND OBJECTIVES

A. Goals:

DEQ NOTE: *You need to discuss why you want to burn; e.g. forest health, silviculture, wildlife, insects / disease, etc. If the goal includes it, don't miss the opportunity to include as an objective the reduction of air quality impacts due to the controlled application of fire and smoke management. Example statement below:*

"Wildland fire was once the most prevalent disturbance in Montana. Before the turn of the century, approximately half of western forests burned every 100 years and stands less than 40 years old made up one third of the forested landscape. Suppression of wildland fire resulted in high fuel accumulations and a shift in forest stand composition and age structure. A combination of heavy forest fuels and periodic drought conditions has led to disastrous and unpredictable wildfire conditions throughout the Beaverhead – Deerlodge National Forest. Wildfires occurring under these conditions are far more destructive than normal and are often extremely difficult or impossible to control. An extreme potential exists for property damage, air quality, public health, and visibility impacts caused by wildfires. Prescribed burning is the primary method of taking out

underbrush, small trees, and dead wood on a regular basis to mitigate wildfire conditions."

B. Objectives:

1. Resource objectives:
2. Prescribed fire objectives:

***DEQ NOTE**: In addition to your primary resource and prescribed fire objectives, you need to discuss your smoke management objectives. When you consider your compliance with national ambient air quality standards (NAAQS) and visibility protection, remember other sources of air pollution exist in addition to the smoke from your burn on that day(s).*

You must recognize that your burn is competing for available airspace with other emission sources such as residential woodstoves, vehicles, industry, agricultural windblown dust, etc., even in remote areas. Example statement below:

"Based upon computer smoke dispersion modeling, smoke from this burn project will not cause or contribute to any NAAQS exceedance or interfere with any visibility protection control strategies."

***DEQ NOTE:** BACT includes promoting alternative treatments. You should discuss alternatives considered as part of this burn. Alternatives to burning are becoming more important as air quality standards become more protective. Example statement of no alternatives chosen below:*

"Alternatives to prescribed burning are applicable when fuel reductions are necessary for ecosystem or habitat management, or forest health enhancement. Alternative methods may be used to accomplish effects similar to what burning would accomplish when fire is used to eliminate an undesirable species or dispose of biomass waste. However, alternatives such as mechanical removal of forest biomass, use of grazing animals, and onsite chipping or crushing were determined to interfere with land management objectives for this project site. Alternatives would cause undue soil disturbance or compaction, stimulate alien plant invasion, impair water quality, or remove material needed for nutrient cycling or small animal habitat. Additionally, mechanical treatments require adequate road access which is not available on the project site."

ELEMENT 6: FUNDING

A. Cost:
B. Funding source:

DEQ NOTE: *Know that you can check out a nepholometer at no charge from the R1-cache. Money may also be saved with a rapid mop-up strategy – less staff time in the field monitoring for slop-overs. This will also reduce total smoke emissions.*

ELEMENT 7: PRESCRIPTION

A. Environmental Prescription:
B. Fire Behavior Prescription:

DEQ NOTE: *You need to decide how complex the topography is for purposes of smoke dispersion forecasting. Choosing the appropriate smoke dispersion model is based, in part, upon topography and elevation. Reference your Smoke Emissions and Dispersion Modeling course book for choosing the appropriate smoke consumption, emissions, dispersion, and visibility model.*

ELEMENT 8: SCHEDULING

A. Ignition Time Frames/Season(s):
B. Projected Duration:
C. Constraints:

DEQ NOTE: *Scheduling affects fuel moisture which affects combustion efficiencies. Be aware of the situation around your burn area to determine if any constraints to smoke management exist. Constraints may be proximity to sensitive features like communities, residents, roads, airports, electronic equipment, etc. Winter burns are considered by DEQ through an application / approval process. However, winter burning in western Montana is difficult due sources of particulate emissions from residential woodstoves, diesel machinery, industrial processes, etc.*

ELEMENT 9: PRE-BURN CONSIDERATIONS

A. Considerations:
1. On Site:
2. Off Site

B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):
C. Notifications:

DEQ NOTE: *You need to determine the PRE-burn project risk of escape (high, medium, low) for economic, political, and social consequences pursuant to FSM 5142.1 guidelines. Include smoke management as an element for risk evaluation. Example statement below:*

"This burn project has been rated as "high" for risk of escape. The computer modeling of smoke emissions indicates high concentrations of smoke in the vicinity of the Elkhorn Hot Springs resort occurring from approximately 18:00 to 20:00 on May 5, 2003. To mitigate impacts on public health, an air quality monitor was obtained from the Region 1 fire cache and established at the resort. Smoke concentrations will be monitored every hour and this information will assist in determining any appropriate action. Mop-up activity was elevated to category four to ensure residual smoke emissions would be minimized by 10:00 on May 6, 2003."*

****EDITOR'S NOTE:*** *Although on-site monitoring may determine your smoke production to be minimal, the use of portable air quality monitoring equipment comes with the potential liability of regulatory actions associated with air quality exceedances, even with non-reference method monitoring equipment. Reference Montana ARM 17.8.132, Credible Evidence rule.*

ELEMENT 10: BRIEFING

Briefing Checklist:

- ❑ Burn Organization
- ❑ Burn Objectives
- ❑ Description of Burn Area
- ❑ Expected Weather & Fire Behavior
- ❑ Communications
- ❑ Ignition plan
- ❑ Holding Plan
- ❑ Contingency Plan
- ❑ Wildfire Conversion
- ❑ Safety

DEQ NOTE: *You should mention that smoke management is everyone's responsibility. Each assignment on the ignition team needs to be properly implemented to mitigate smoke emissions.*

ELEMENT 11: ORGANIZATION AND EQUIPMENT

A. Positions:
B. Equipment:
C. Supplies:

DEQ NOTE: *You should mention that smoke management is everyone's responsibility. Each assignment on the ignition team needs to be properly implemented to mitigate smoke emissions.*

ELEMENT 12: COMMUNICATION

A. Radio Frequencies

1. Command Frequency(s):
2. Tactical Frequency(s):
3. Air Operations Frequency(s):

B. Telephone Numbers:

DEQ NOTE: *You should mention that smoke management is everyone's responsibility. Each assignment on the ignition team needs to be properly implemented to mitigate smoke emissions.*

ELEMENT 13: PUBLIC AND PERSONNEL SAFETY, MEDICAL

A. Safety Hazards:
B. Measures Taken to Reduce the Hazards:
C. Emergency Medical Procedures:
D. Emergency Evacuation Methods:
E. Emergency facilities:

DEQ NOTE: *You need to ensure the public is aware of your burn project. You may notify the public using mass media, bulletin board posters, personal contacts, and/or road signs. Smoke impacts in residential areas, on roadways, or in Class I areas are of greatest concern. Additionally, public health notification is important for large, multiple-day burning. Portable air quality monitors are available from the Region 1 fire cache in Missoula. Example statement below:*

"To deter the public from entering the project area during ignition, all access points into the area will be posted with road signs alerting travelers of the intended action. The project area will be inspected prior to ignition for unauthorized individuals. Individuals will be instructed to leave and owners of property will be notified to remove items prior to ignition.

Weather conditions, fuel loading, fuel composition, and proximity to a fire are important factors that affect the smoke concentrations in a particular area. An air quality monitor will be established at Elkhorn Hot Springs resort to measure concentrations at specific intervals during the day and night of the predominant pollutant in wildfire smoke that affects health and visibility. Information obtained from this monitor will be used to compare local air quality to federal and state health standards."

DEQ NOTE*: Include your airshed coordinator as a contact in addition to the Smoke Management Program Coordinator, (406) 329-4952. For purposes of smoke*

management contingency planning, list the state air quality meteorologist, (406) 444-5272, and your county sanitarian.

ELEMENT 14: TEST FIRE

A. Planned location:
B. Test Fire Documentation:

4. Weather Conditions On-Site:
5. Test Fire Results:

DEQ NOTE: *You should mention that smoke management is everyone's responsibility. Each assignment on the ignition team needs to be properly implemented to mitigate smoke emissions.*

ELEMENT 15: IGNITION PLAN

A. Firing Methods:
B. Devices:
C. Techniques:
D. Sequences:
E. Patterns:
F. Ignition Staffing:

DEQ NOTE: *You should mention that smoke management is everyone's responsibility. Each assignment on the ignition team needs to be properly implemented to mitigate smoke emissions.*

ELEMENT 16: HOLDING PLAN

A. General Procedures for Holding:
B. Critical Holding Points and Actions:
C. Minimum Organization or Capabilities Needed:

DEQ NOTE: *You should mention that smoke management is everyone's responsibility. Each assignment on the holding team needs to be properly implemented to mitigate smoke emissions.*

ELEMENT 17: CONTINGENCY PLAN

A. Trigger Points:
B. Actions Needed:
C. Additional Resources and Maximum Response Time(s):

DEQ NOTE: *You need to address how you will address potential smoke dispersion situations where public health or visibility are adversely affected. Example statement below:*

"Should a smoke dispersion situation exist that negatively affects public health, roadways, or other sensitive features, the burn boss will immediately take the appropriate suppression action (confine, contain, control) to reduce smoke emissions to the point where the adverse impacts are eliminated."

ELEMENT 18: WILDFIRE CONVERSION

A. Wildfire Declared By:
B. IC Assignment:
C. Notifications:
D. Extended Attack Actions and Opportunities to Aid in Fire Suppression:

DEQ NOTE: *Emission from wildfires are not regulated by DEQ. Be sure to separately document blackened acres from the prescribed burn and blackened acres from wildfire.*

ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY

A. Compliance:
B. Permits to be Obtained:
C. Smoke Sensitive Areas/Receptors:
D. Impacted Areas:
E. Mitigation Strategies and Techniques to Reduce Smoke Impacts:

DEQ NOTE: *You need to outline all applicable environmental regulations such as streamside management zones , endangered species, and water / air quality. If you are burning in Lincoln, Missoula, or Flathead County, you must follow those local air quality program regulations. Example statement and MT-DEQ regulations below:*

"The USFS is a member of the Montana / Idaho Airshed Group, whose membership includes those agencies with an interest in the use of fire for resource management purposes and is committed to preserving Montana's air quality. Montana is divided into 10 airsheds. This burn project is located in Airshed 7. The Montana Department of Environmental Quality (MT-DEQ) requires that members submit a list of planned burns to the Monitoring unit located in Missoula. From information contained in the permit application, the monitoring unit issues daily decisions in the fall season that can either restrict or permit burning to proceed / continue.

To protect Class I air-quality-related values, NAAQS, and visibility, this burn project will follow the state regulations for best available control technology (BACT) and ensure that particulate concentrations do not exceed standards or impact visibility.

The burning seasons and notifications requirements under MT-DEQ regulations are as follows:

During the period of December through February, no burning will be conducted, as open burning is generally prohibited by state rule. Reference MT-DEQ air quality rule 17.8.606.

Prescribed burn operations during the period of March through May will conform to the guidelines applicable to the General Open Burning Season that require good or excellent ventilation and other conditions in MT-DEQ air quality rule 17.8.606.

Prescribed burn operations must conform with the Best Available Control Technology (BACT) year-round pursuant to MT-DEQ air quality rule 17.8.606 and any other conditions set forth in the permit."

DEQ NOTE: *You need to describe the project area in general. This will assist in identifying sensitive features. Example statement below:*

"The Elkhorn wildlife management burn project is generally located two miles north of Elkhorn Hot Springs and one mile west of Forest Service road #484. Many historical sites are located in proximity to the burn project, attracting many tourists year-round. Montana's Territorial Capital, Virginia City, and Nevada City are all located south of the burn project. The community of Polaris (pop. ?) is located at the southern end of the Pioneer Mountains Scenic Byway, while Elk Horn Hot Springs resort and Maverick Mountain Ski Area are located within view of the burn project. The burn project is located in the mountain headwaters forming the Big Hole River which converge near the community of Jackson (pop. ?).

The communities of Butte (pop. 33,892) and Anaconda (pop. 9,417) lie north of the burn project and attract many tourists. The Pioneer Mountains Scenic Byway leads to the community of Wise River (pop. ?) with access to remnants of the Elkhorn Mill, the ghost town of Coolidge, and Crystal Park. The community of Wisdom (pop. 114) and the Big Hole National Battlefield, a historic site that memorializes the 1877 battle between the Nez Perce and Col. John Gibbon are located west of the burn project. The community of Dillon (pop. 3,752) lies east of the burn project, while nearby Clark Canyon Reservoir offers seasonal fishing, boating, and camping.

The Beaverhead County area is unique in that it is both cold and dry. Precipitation varies widely. Average annual amounts range from 10 inches in Dillon to over 50 inches in mountains forming the Continental Divide to the west. Two-thirds of precipitation in mountains is snow. Dillon averages 99 frost-free days annually. Cloudy weather rarely exceeds more than several days. Average annual temperature in January is 21ºF and in July is 66ºF."

DEQ NOTE: *Sensitive features include cultural / historical sites, endangered plant or animal species, private timber / range lands, noxious weed species, etc. Sensitive features must always include those features that may be affected by your smoke to a minimum 50 mile radius from your burn project. These may include air quality nonattainment areas, mandatory and designated Class I federal areas (select national parks, wildernesses, and Indian reservations for visibility protection), public roadways, airports, hospitals, retirement homes, recreation sites, residential home sites, etc. Example statement below:*

"Sensitive features within 50 miles of this burn project include many public recreation sites, particularly the Elkhorn Hot Springs resort. The spring season attracts many tourists to the area for late season snowmobiling, downhill and cross-country skiing, and early season trail hiking. Critical concern for this burn project is negative smoke impact on Beaverhead County Road #2 leading to the community of Polaris and Elkhorn Hot Springs resort. Additional concerns include smoke impacts to Montana Highway 43 that runs east-to-west within approximately 15 miles south of the project area.

Other sensitive features include the town of Dillon and Interstate Highway 15 located approximately 50 miles to the east and the historic town of Bannack located approximately 45 miles to the south. The communities of Wise River, Anaconda, and Gregson Fairmont Hot Springs are approximately 45 miles north of the project burn. The city of Butte, located approximately 40 miles northeast of the burn project, is a PM-10 nonattainment area. Computer smoke modeling indicates that smoke from this burn project is expected to have impacts of less than 5 micrograms per cubic meter ($\mu g/m^3$) for 24-hour average in these communities. The Anaconda Pintler and Red Rocks Lake Wilderness Class I federal areas are located more than 100 miles from the burn project. Therefore, mitigation measures for visibility protection were not considered."

DEQ NOTE: *You need to qualitatively and quantitatively describe the air quality impacts from your burn project as best you can. Example statement below:*

"For this project, the pollutant of concern is PM-10 (particulate matter with an aerodynamic diameter of 10 microns and less) and PM-2.5 (particulate matter with an aerodynamic diameter of 2.5 microns and less). The federal and state air quality standards for PM-10 are 150 $\mu g/m^3$ for a 24-hour period and 50 $\mu g/m^3$ annually (state only). The federal air quality standards for PM-2.5 are 35 $\mu g/m^3$ for a 24-hour period and 15 $\mu g/m^3$ annually. Based upon a conservative estimation of smoke emissions, this project is not considered to cause or contribute to any NAAQS exceedances.

This 100-acre understory burn is scheduled for ignition in early spring to take advantage of higher 1000- and 100-hour fuel moistures, while allowing for a higher spread component with lower 1- and 10-hour fuel moistures. Smoke production was calculated by a computer model at 1,500 pounds of PM-10 and 1,000 pounds of PM-2.5 for 24-hour measurements at the maximum concentration site. The smoke dispersion model utilizing average springtime wind speeds, direction, and relative humidity demonstrated short-term impacts of < 10 $\mu g/m^3$ for 8 hours on local recreational activities to the south, but no significant impacts over a 24-hour period. The burn project was estimated to produce 25 $\mu g/m^3$ of PM-10 and 20 $\mu g/m^3$ of PM-2.5 over a 24-hour average at the maximum concentration site.

The closest ambient air quality monitoring stations are located at the West Fork Ranger Station and Butte, approximately 50 and 45 miles to the west and northeast, respectively. PM-2.5 particulate monitoring illustrates exceedances of new PM-2.5 NAAQS. Therefore, all efforts to minimize smoke impact to Butte will be taken. Although this burn will contribute additional emissions to Airshed 7, other existing source emissions occurring during this burn are considered to be minimal. Table 1 summarizes the regional particulate matter monitoring information for the past eight years below:

TABLE 1
BUTTE PM-2.5 (µg/m^3) 24-HOUR MONITORING VALUES[1*]

YEAR	1st HIGH	2nd HIGH	3rd HIGH	4th HIGH
1999	38	35	31	21
2000	134	63	58	52
2001	37	23	22	22
2002	31	29	27	20
2003	45	44	39	34
2004	43	42	30	27
2005	50	39	36	34
2006*	54	42	39	39

[1] Federal 24-hour PM-2.5 standard is 35 µg/m^3.
** exceptional event data not excluded.*

ELEMENT 20: MONITORING

A. Fuels Information (forecast and observed) Required and Procedures:
B. Weather Monitoring Required and Procedures:
C. Fire Behavior Monitoring Required and Procedures:
D. Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:
E. Smoke Dispersal Monitoring Required and Procedures:

DEQ NOTE: *You need to describe the burn project weather forecast and its role as a smoke management control strategy. Example statement below:*

"A dispersion weather forecast will be performed to assess the dispersion capabilities of the atmosphere prior to ignition. Good or favorable dispersion capabilities will allow the burn project to occur without exceeding NAAQS or compromising visibility, provided the amount of prescribed burning does not overload the capacity of the atmosphere to disperse the smoke emissions. The capacity of the atmosphere to disperse smoke emissions from this burn project will be estimated based upon three primary factors: atmospheric stability, mixing height, and transport wind speed.

Atmospheric stability is the tendency for vertical mixing of both the convective and non-convective emissions. The optimum weather condition for this burn project will be an unstable atmosphere that would cause good mixing of smoke plumes with little, if any, long-term high volumes of smoke. Strongly unstable conditions may not be favored due to potential fire hazards associated with high rates of spread.

Mixing height is that elevation level in the atmosphere at which the mixing process is relatively complete. This condition changes markedly during the course of a day. This burn project will be conducted during an unstable atmosphere and the mixing height will be determined by comparing the current surface temperature with the upper-air temperature profile measured during the morning hours.

Transport wind speeds refers to the average diluting wind speed within the smoke-laden layers of the atmosphere. Pollutants within the mixing layer are directly diluted by the transport wind speed. The Smoke Management Program in Missoula will assist the District in determining the metrological conditions favorable for the burn project."

ELEMENT 21: POST-BURN ACTIVITIES

Post-burn Activities That Must be Completed:

DEQ NOTE: *You need to summarize burn project progress with regard to smoke management. Photographs are very important to document activity and protect against any potential liability situations. Example statement below:*

"The Elkhorn Wildlife Management Burn was ignited on May 5, 2003 at 10:30. Ignition strategy was a strip-head backfire on upper 1/3 unit – with a center fire / jackpot ignition strategy for the middle and lower 1/3 unit. Heat was quickly generated and the resulting smoke emissions broke the early morning mountain inversion and dispersed into the atmosphere without affecting sensitive features. See attached time-sequenced photographs. Ignition followed a determination by the burn boss that all required prescription elements were met for fuel moistures, relative humidity, ambient temperatures, eye-level and 20-foot windspeeds, and smoke management program burn authorization.

Flaming phase for this burn project lasted approximately until 13:00 with an intense smoldering phase lasting until 17:00. Cooler nighttime temperatures and diurnal winds pulled remaining smoke emissions down-canyon toward Elkhorn Hot Springs resort. The monitoring station located at the resort indicated PM-10 emissions peaked at 20 $\mu g/m^3$ at 17:30, dissipating to 5 $\mu g/m^3$ by 20:00 (strip chart included in Appendix "R"). These smoke concentrations were within the expected parameter and caused no public health or visibility concerns. Mop-up category four was rigorously pursued beginning on May 6, 2003 at 06:00 that resulted in no detectable smoke emissions by 10:00.

NOTE: *Future agency burns in this area should be aware of rapid change in local temperature and windspeed following the burn period. Holding crews should be positioned to secure line on all sides of the burn project. Two phone calls were received regarding this burn project. Mrs. Johnson (406) 555-1224 and Mr. Smith (406) 555-4567 from Polaris expressed concern about fire severity and their adjacent livestock and timber interests. Additionally, Mr. Johnson has severe asthma and needs time to leave the area before burns are ignited. Contact these individuals prior to any future burns in this area."*

APPENDICES

A. Maps: Vicinity and Project

B. Technical Review Checklist

C. Complexity Analysis

D. Job Hazard Analysis

E. Fire Behavior Modeling Documentation or Empirical Documentation (unless it is included in the fire behavior narrative in Element 7; Prescription)

DEQ NOTE: *In addition to project level maps, you should include a general vicinity map and highlight sensitive features and approximate distances to each. Clearly identify administrative boundaries such as airsheds and land ownership.*

DEQ NOTE: *Reference all relevant documents that support your actions for this burn project to reduce any potential liabilities associated with smoke management and any other burn-associated effects.*

REFERENCES:

- *Acheson, A., Hammer, B., Stanich, C. and Story, M. 2000. Describing Air Resource Impacts from Prescribed Fire Projects in NEPA Documents for Montana and Idaho in Region 1 and Region 4. 36 p.*
- *NWCG. 2001. Smoke Management Guide for Prescribed and Wildland Fire 2001 Edition. PMS 420-2 NFES 1279. 226 p.*
- *USDI/USDA. 1995. Federal Wildland fire management policy and program review. Final report. National Interagency Fire Center, Boise, ID. 45 p.*
- *USEPA. 1992. Prescribed Burning Background Document and Technical Information Document for Prescribed Burning Best Available Control Measures. EPA-450/2-92-003.*
- *Zimmerman, G. T. and Bunnell, D.L. 1998. Wildland and Prescribed Fire Management Policy – Implementation Procedures Reference Guide. Interagency publication. 92 p.*

DEQ NOTE: *Appendix all relevant information that support your actions for this burn project to reduce any potential liabilities associated with smoke management and any other burn-associated effects.*

APPENDICES:

A. Smoke Management Program Authorization
B. Emission Reduction Techniques
C. Burn Organization
D. Prescribed Fire Qualifications
E. Overhead Check List
F. Burn Boss Check List
G. Health and Safety Hazard Analysis
H. Probability of Ignition
I. Information and Involvement Plan
J. Guidelines for Escape and Consequence Assessment
K. Complexity Elements Worksheet
L. BEHAVE Computer Runs

M. *CONSUME Computer Runs*
N. *SASEM Computer Runs*
O. *FOFEM Computer Runs*
P. *RXWINDOW Computer Runs*
Q. *Post Burn Evaluation Photos*
R. *Elkhorn Hot Springs Resort Monitor Strip Chart*

Recommended for Approval: **Not Recommended for Approval:**

_____	_____	_____
Technical Reviewer	Qualification and currency (Y/N)	Date

☐ **Approval is recommended subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.**

END OF DOCUMENT

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